

# AUUG 2001

*"Always On and Everywhere"*

Tutorials:  
Conference:

23-25 September 2001  
26-28 September 2001

UTS (University of Technology), Sydney  
Carlton Crest Hotel, Sydney

| <b>TUESDAY<br/>25 SEPTEMBER</b>            | <b>TIME</b>                    | <b>TUT<br/>NO:</b> | <b>TUTORIAL TITLE</b>  |
|--|--------------------------------|--------------------|--|
| <b>Half Day<br/>Afternoon<br/>Tutorial</b> | <b>1:30pm<br/>-<br/>5:00pm</b> | <b>T14</b>         | <b>Computer History:<br/>Methods and Problems<br/><i>by Peter H. Salus</i></b> |

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*order.mids.org/  
~peter/index.html*

## Chapter 0

# The Big Picture

## Internet History

- 1969: ARPA R&D project
  - packet-switching network
  - robust
  - reliable
  - vendor-independent
  - decentralized operation
- 1975: experimental→operational

# Computer History

## Methods and Problems

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SEMIOTICS 1980

# WHAT IS EVIDENCE EVIDENCE OF?

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On Friday, March 4, 1881, Inspector Tobias Gregson of Scotland Yard informed Mr. Sherlock Holmes of "A bad business at 3, Lauriston Gardens, off the Brixton Road." There an American named Enoch J. Drebbler had been murdered, and no clue -- or no clue apparent to Gregson and his colleague Lestrade -- was present, save the letters "R-A-C-H-E" scrawled in blood along the wall. To Gregson and Lestrade the letters are evidence of a crime of passion, for the victim was quite obviously trying to write the woman's name, "Rachel," in his own blood before expiring. To Holmes, who wraps up the entire affair over the weekend, the writing read Rache, the word for "revenge" in German. Watson was overwhelmed, but no more than were the readers of Beeton's Christmas Annual in 1887.

Another anecdote before moving into the discussion.

In 1954, Jacques Barzun published an edition of the letters of Hector Berlioz (1803-1869). Among these is one headed "19 rue de Boursault/Thursday June 23," addressed to some publisher, and concerning the "Table of Contents" for a book they had apparently discussed.

The address is a Parisian one, and one at which Berlioz lived from July 1849 through April 1856. The work must fall in those years. A calendar supplies the information that in 1853 June 23rd fell on a Thursday. But the only book Berlioz executed in that time span was finished in May 1852 and published that December. So we must look at 1852, not 1853. But



June 23rd wasn't a Thursday in 1852. However, we also know that Berlioz was in London, not Paris in June 1853; and we can see from other sources that he frequently mistook the day of the week. We conclude, as Barzun did, that Berlioz made an error in writing "Thursday" for "Wednesday," that the letter dates from 1852, and that it must have been addressed to Michel Lévy, a well-known publisher. Unfortunately, the publisher's records have not survived the century, and so we have only "internal evidence" to work with.

I have recounted these two anecdotes from very different types of detection at the outset of this paper, because I would like to ask some very basic questions about the nature of data in general. Perhaps, in an obfuscatory way, one might consider my asking questions of the very nature of an "evidentiary paradigm," not so much in semiotics as in any area whatsoever.

When T.H. Huxley's young son died of scarlet fever, Charles Kingsley attempted to console him with a peroration on the immortality of the soul. Huxley, who invented the term "agnostic" to describe his feelings, rejected the professed comfort for lack of evidence.

My business is to teach my aspirations to conform themselves to fact, not to try and make facts harmonize with my aspirations... Sit down before the fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses nature leads, or you shall learn nothing.

Huxley did not follow his own dictum, and I doubt whether any scientist (from Greece through the present) ever has. But he also noted that science was "organized common sense," in opposition to the dictum of the contemporary geologist Lyell, who claimed that science must probe behind appearance, often to combat the "obvious" interpretation of phenomena.

In several papers and an excellent book, Elizabeth Loftus has demonstrated conclusively just how poor eyewitness testimony is, and how the nature of the questions asked slants the nature of the recalled perception. The only conclusion one can draw from her work is that eyewitness testimony is unreliable, inconsistent, and likely to be at variance with that

which was, in fact, witnessed. Our conclusion is not so much that seeing isn't believing, but that recollecting and reporting have little to do with seeing. If memory in general is a reconstructive process, as numerous experimenters have demonstrated to my satisfaction, then evidential reportage is a process of subjective embroidery, not reconstruction.

The incident of the Berlioz letter (and many other incidents cited in Barzun and Graff) appears to demonstrate that we cannot trust the participant's own documentation, any more than we can trust the eyewitness. And the episode from *A Study in Scarlet* shows that even when all the parties agree on just what the evidence is (the letters R-A-C-H-E in blood on a wall), their notions as to just what this indicates are at variance.

The notion of evidence depends on our recognizing and classifying phenomena. Just 300 years ago, John Locke made the point that species do not exist in nature, that taxonomies are fabricated by men's minds and imposed upon phenomena. Nature does not come to us in neat packages.

I would agree with Locke in stating that it is a basic function of man's brain to taxonomize what it encounters. In this I am at odds with such eminent biologists as Ernst Mayr and Stephen Jay Gould, but find concurrence in the works of J.B.S. Haldane, who wrote: "The concept of a species is a concession to our linguistic habits and neurological mechanisms."

Science is not, as Gould has remarked in another context, what the common man thinks it is: the patient collection and sifting of "hard" facts. Rather, science is "a human activity, motivated by hope, cultural prejudice, and the pursuit of glory" (1980:115f.). In fact, much of science might be considered as the "imposition of strong hope upon dubious evidence." All three of the following cases, drawn from the work of Persi Diaconis, demonstrate different uses of what might be called evidence.

(1) Bode's Law of Planetary Distances. Bode's Law says that the distance of the planets from the sun is proportional to  $4 + 3 \cdot 2^n$ , where  $n = -\infty, 0, 1, 2, \dots$  With but minor deviations, the Law apparently fits the facts (the asteroids occupy an approximate slot; the outer planets -- undiscovered when Bode formulated his theory -- fit remarkably well).

Over the years, several authors have tried to quantify the degree of accuracy of Bode's Law. Good (1968) concluded that the odds were better than 300:1 in favor of Bode's Law, were we to discover a new solar system; Efron (1972) concluded that there were roughly even odds that Bode's Law would hold. What makes these conclusions and the data concerning the Transjovian planets interesting is that "We do not know that Bode decided to look at the distances of the planets from the sun. Rather he might well have begun by looking, more generally, at numbers connected to the solar system -- weights, separation between planets, density, and much else. Extracing some order from some part of this larger set of numbers might be far easier than suggested by Good and Efron" (Diaconis 1980). In fact, given Locke's notion of our imposing order upon the Universe, it is quite likely that, given a large array of data concerning a few planetary bodies, we can invent some ratio which will relate a portion of the data. In another area entirely, James Deese has remarked that there are no two facts which the human mind cannot combine into a single metaphor (1974-75).

(2) Ozone. Over the past few years, Cleveland et al. (1974, 1976a, 1976b, 1979) and Bruntz et al. (1974) have examined air pollution in several eastern cities. They have noted that ozone, a secondary pollutant which is presumed to result from the chemical interaction of two primary pollutants, is more common on weekends, when there is less industrial activity, than during the week, when there is more. This suggests that we do not really understand either how ozone is produced, nor the mechanisms of air pollution at all. We have tremendous amounts of data. We have masses of evidence of varying quality. But we don't know what to do with it, nor what it means. To quote my own title, we have the evidence, but we don't know what it's evidence of.

(3) Birthday/Deathday. In 1972, D. Phillips published a finding that there was an association between people's birthdays and their deathdays, more people dying just after their birthday than just before. Diaconis had a statistics class at Stanford test Phillips' claim on data drawn from reference works like *Who's Who*. In other words, they tested the hypothesis on new data. All the formal tests rejected Phillips' hypothesis. One of the students performed an innovative analysis which showed a weak correlation. If there is an effect, it is not a very strong one. But what are we to believe?

## EVIDENCE

standard statistical analysis rejects the hypothesis; an informal, innovative analysis shows a weak correlation.

The first of these three examples, the one concerning planetary distances, has no clear way for a test against new data, yet this is a standard way of testing hypotheses; the last example, that of birthday/deathday, shows that a standard analysis of the new data rejects the hypothesis, though a new method confirms it. Effectively, running the same experiment refutes; altering the experimental paradigm, confirms.

Given this material, let us now look at the notion of evidence.

Aristotle (*Metaphysics* IX, 10, 1051, b3) held that the question of truth was bound up with making judgements related to things in a way which corresponded to them. That is, if your judgement is in concord with the data, it is true. But this says nothing of the things upon which the judgements are founded. Hume (*Enquiry Concerning Human Understanding*, Section IV) tells us that evident is comprised of analytic judgements, but that these judgements are not based on the so-called inferences from experience, for these are not the effects of reason, but only of unreasonable habit or custom (Section V).

More recently, Mach tells us that the nature of evidence is bound up with an irresistible compulsion which keeps us from giving up the notion of that datum as true. This is, I suppose, based on the Cartesian notion of counting as true that which one is incapable of doubting. For Descartes, at least, there was a distinction between something being really evident, and something which merely had a large number of instances.

Sixty-five years ago, Brentano remarked:

If evidence always pertains to judgements, the question arises whether evidence is related to judgement as a specific difference or as an accident. The latter possibility would be excluded at the outset if, as is generally taught, there can be no accidents of accidents. And the former possibility would be excluded if, as is also generally taught, there can be, for any genus, only

specific differences which are opposed to each other; for if there are any opposing specific differences falling under the genus of judgement these would certainly be affirmation and denial. But neither affirming nor denying excludes evidence, for some things are affirmed with evidence and some things are denied with evidence. ([1915] 1966:127)

In a fragment written a few days later, Brentano remarks that "A man can be said to have direct, affirmative, and therefore factual evidence concerning ... a thing only if it would be contradictory to say that, although he is thinking of the thing, the thing does not exist" (1966:132). Apparently, Brentano believed that the evidentiary nature of a thing was an accident of that thing.

Finally, let us glance at Price's comments (1969). Price states:

We should all agree that a person can only believe reasonably when he has evidence for the propositions believed. Moreover, our evidence for a proposition *p* which we believe must be stronger than our evidence (if any) against that proposition, if our belief is to be reasonable. Nor is this all. Belief admits of degrees. And if we are to believe reasonably, the degree of our belief must be no greater than our evidence justifies. For instance, it would be unreasonable to believe a proposition with complete conviction if our evidence, though good..., falls short of being conclusive, though it would still be reasonable to believe with a good deal of confidence. (92)

While Price discusses the etymology of the item, and notes that evidence "may be strong or weak" and that there "may be evidence against a proposition," he nowhere discusses the actual nature of evidence.

An Associated Press release of 12 October 1980 revealed that a computer program had predicted that the Philadelphia Phillies would win the playoffs in the National League, and that this same computer was now predicting that the Phillies would win the World Series in six games. The release appeared to consider this some form of truth, especially as it emanated from a computer, not a bookie in Las Vegas. I consider this

no evidence of anything concerning baseball, as I assume that given the mass of baseball statistics, there were calculations elsewhere that predicted the Astros would win the playoffs; and others, sifting through the mass, which predict a Royals victory in the World Series. At the New York Academy of Sciences Conference on the "Clever Hans" phenomenon last May, Karen Pryor remarked, concerning the legendary activity of dolphins rescuing swimmers, that it is normal dolphin behavior to buoy up floating animate objects, as they do with their own young and with ailing conspecifics; but, more importantly, we never hear of those swimmers who are not buoyed up, or who are pushed out to sea, rather than in to shore. The evidence from Pliny to the present is not really evidence at all. Or, rather, it is only evidence that some weakened swimmers have been aided (not rescued) by aquatic mammals.

Let me set up an imaginary relationship. Let us say that through a fortuitous circumstance someone notes that just as the Premier of Quebec lights a cigarette, I begin to cough. Over a period of time it is noted that I do so invariably, even when the Premier is in Quebec City and I am in Jacksonville. Through the aid of videotape and the telephone, it is ascertained that there is a 1:1 relationship between these two events. Would any of us accept a theory of causality between them? I warrant not, despite the good statistical fit of the phenomena. Looking at this from Aristotle's point of view, though there is a good degree of concord where the data are concerned, our judgements are not in concord, and so we reject this evidence. But why?

My suggestion is that we do so because each of us has a world picture, and that data which do not conform to it are rejected. We consider them fortuitous or spurious. They are the "observational errors" and events at the tails of the curves scientists reject. We accept the astronomer's prediction of an eclipse because his knowledge of the movements of planetary bodies fits our gestalt view; we reject the astrologer's predictions (based on these same movements) because our world view is that Shakespeare was right, and the faults are not in the stars, but in our selves. We are willing to accept the notion that while people are born and die throughout the year, there may be a relationship between the birthday and deathday of any individual. Thus an exceedingly strong statistical correlation between M. Levesque's smoking and my coughing is rejected, while a weak correlation between dates



is acceptable. However, I'd like to go even further than this in examining some evidentiary paradigms we live by.

Despite such work as that of Elizabeth Loftus, courts generally accept eyewitness testimony, even when it is quite corrupt. The case of Sacco and Vanzetti is most likely the best example of deaths founded in obviously faulty eyewitness testimony in American judicial history. But the rejection of good evidence also occurs.

A month ago, Daniel A. Bronstein pointed out that contrary to popular opinion, the Hooker Chemical Corporation may evade conviction in the Love Canal case. This is because the Hooker case is a tort/nuisance suit seeking monetary payments to people for injuries resulting from past actions of the defendant. A tort suit requires that the plaintiff demonstrate that but for the defendant's action the injury would not have occurred. As Bronstein stated, "Courts have a great deal of difficulty accepting statistical evidence as proving 'but for' causation. Even the best possible study (cytological, epidemiological, or other) could merely conclude that 'with a 95 percent (or 99 percent, or any other level) degree of confidence, this chemical pollution resulted in these ... effects.' Many legal writers think such a statement might not be sufficient to persuade a court that 'but for' causation had been demonstrated" (1980: 1470). In other words, we have here an instance where the courts apply a more rigorous standard of evidence in a damage suit than in applying the death penalty; and a more rigorous one than either the man on the street or the scientific community would apply.

My last example is from paleontology. In 1912 Charles Dawson brought forward some fragments of a fossil skull and jaw and claimed for Great Britain the stakes in the protoman derby. There had been a good deal of insular inferiority because of the wealth of continental fossils (Cro-Magnon, Neanderthal, etc.), whereas there were no British relics at all. The late Teilhard de Chardin as well as a number of British paleontologists supported the antiquity of the fragments (as well as others produced by Dawson some years later), and the reconstructed hominid was called 'Pittdown Man.' It was 40 years before the hoax was fully uncovered. But it is interesting to note that David Waterston had identified the skull as human and the jaw as an ape's in 1913,

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and in the 1940's Weidenreich suggested that the Pittdown Man "should be erased from the list of human fossils. It is the artificial combination of fragments of a modern human braincase with orang-utangle mandible and teeth" (See Gould 1980:108-124). Modern dating methods have shown that these were synthetically machined and aged fragments. But what I am interested in is the way the evidence was received. Sir Arthur Keith responded to Weidenreich with: "This is one way of getting rid of facts which do not fit into a preconceived theory; the usual way pursued by men of science is, not to get rid of the facts, but frame theory to fit them." But the irony is that it was Sir Arthur who was bending facts: he wanted the earliest large-brained hominid to stem from the British Isles; he and his colleagues wanted to demonstrate that the home of intellectuation could not be on the European continent, nor in decadent Asia or degenerate Africa. As the British were the most superior people, the must have had a longer evolutionary history -- and the oldest fossils.

As I mentioned earlier, Gould has referred to science as "a human activity, motivated by hope, cultural prejudice, and the pursuit of glory." Cultural prejudice and the pursuit of glory were certainly at work where the Pittdown hoax was concerned; cultural prejudice was certainly at work where the evidence at the Sacco and Vanzetti trial was concerned. Certainly it is hope that has us apply statistical measures to an olio of data to see whether something is there...anything. Certainly it is cultural prejudice tempered with hope that decides what might and what might not be so. For cultural prejudice is what shapes our world view, and it is our world view that determines whether we accept the notion that industrial pollutants have some bearing on ozone, though distant in space and time, and whether we reject the notion that while smoking can cause bronchial distress locally, it cannot do so distantly.

I believe that we can demonstrate quite clearly that highly subjective criteria go into the decision as to what is evidence in the physical and biological sciences, and just what that evidence is evidence of. I believe that bias and "experimenter effects" are even more prejudicial to our evidentiary decisions where the behavioral sciences are concerned. Semiotics is inextricably involved with behavioral research, and in it the notion of empirical research may not even exist. In the microcosm of subatomic physics questions are raised as to which lines on photographic plates represent "events" and

which ones are artifacts. But if phenomena are random, and merely massed into apparently coherent wholes by men's minds; if experimenters are constantly interacting with their subjects; if we should foster "magical thinking" -- the belief that simple pattern can be found in data; then does the concept of "evidentiary paradigm" have any meaning at all? And what would we consider adequate evidence?

In the light of the subjectivity of everything in the various experiments and hypotheses I have mentioned here, I think our only solution harks back to Aristotle: if your judgement about something is in concord with the data, it is true. And those things which demonstrate the truth of what we judge correct, are evidence for it.

But why would anyone write the Heschyian gloss for 'thornbush, hedge' on the wall at 3, Lauriston Gardens?

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**Date:** Fri, 06 Apr 2001 00:17:39 -0700  
**From:** Armando Stettner <aps@digeo.com>  
**To:** Peter Salus <peter@matrix.net>

**This year, the UNIX License plate will be 20 years old!!! They were given out in 1981 at a conference in, I think, California.**

**Wow - centuries ago....**

**aps.**

**Date:** Sun, 08 Apr 2001 15:16:05 -0700  
**From:** Armando Stettner <aps@digeo.com>  
**To:** Peter Salus <peter@matrix.net>

**Damn. I could have sworn that was 1981. Maybe 1983 is right. Maybe I'm having memory leaks....**

**aps.**

**Peter Salus wrote:**

>  
> I did a bit of dredging. It looks to me as though  
> you introduced the license plate at the 1983  
> USENIX in San Diego. Is that wrong?  
>  
> P

[¶ 68,246] *United States v. Western Electric Company, Incorporated, and American Telephone and Telegraph Company.*

In the United States District Court for the District of New Jersey. Civil Action No. 17-49. Filed January 24, 1956.

Case No. 971 in the Antitrust Division of the Department of Justice.

#### Sherman Antitrust Act

Department of Justice Enforcement and Procedure—Consent Decrees—Specific Relief—Types of Businesses in Which Defendants May Be Engaged—Telephone Service and Equipment Manufacturing Companies.—A telephone operating company and its subsidiary, a manufacturer of telephone equipment, were each prohibited from commencing, and after three years from the date of the decree from continuing, to manufacture for sale or lease any equipment which is of a type not sold or leased to the defendants or their subsidiaries, for use in furnishing common carrier communications services, except equipment used in the manufacture or installation of equipment which is of the type so sold or leased.

After three years from the date of the decree, the subsidiary was prohibited from engaging in any business not of a character or type engaged in by it or its subsidiaries for the defendants or their subsidiaries, with certain exceptions.

The decree provided that no sale of any subsidiary or assets made necessary by the above prohibitions need be made otherwise than at a fair price and on reasonable terms nor should it be made except to a person approved by the court.

Also, the telephone operating company was prohibited, with specified exceptions, from engaging, either directly, or indirectly through its subsidiaries other than its manufacturing subsidiaries or its subsidiaries, in any business other than the furnishing of common carrier communications services.

See Department of Justice Enforcement and Procedure, Vol. 2, ¶ 8301.10, 8421.

Department of Justice Enforcement and Procedure—Consent Decrees—Specific Relief—Licensing of Patents—Furnishing of Technical Information.—A telephone operating company and its subsidiary, a manufacturer of telephone equipment, were each ordered to grant nonexclusive licenses under any existing or future patent to make, have made, use, lease, and sell any and all telephone equipment. The decree provided that such licenses were to be royalty free or at reasonable royalties, depending upon the person to whom the license was issued or the patent sought to be licensed. The licenses were to be granted upon the condition that an applicant for such a license should grant to the defendants at reasonable royalties licenses to make, use, lease, and sell such equipment useful in furnishing common carrier communications services and such machines, tools, and materials useful in manufacturing or operating any such equipment under any existing or future patent under which the applicant may have the right to grant licenses.

The decree provided that the provisions requiring the defendants to grant royalty-free licenses should not be deemed to constitute a finding that such patents are without value or that the defendants are not entitled to full damages and an injunction in the case of infringement of any such patent by any unlicensed person. The decree further set forth the procedure for the establishment of royalties, the provisions which must be included in such licenses, and the provisions which could be included in the licenses. The defendants were required to furnish technical information relating to the patents under certain terms and conditions.

See Department of Justice Enforcement and Procedure, Vol. 2, ¶ 8301.30.

Department of Justice Enforcement and Procedure—Consent Decrees—Specific Relief—Cost Accounting Methods.—A manufacturer of telephone equipment was ordered to maintain cost accounting methods that conform with such accounting principles as may be generally accepted and that afford a valid basis for determining the cost to it of equip-



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Number

## UNIX NEWS

*Improved mag tape handler p.7  
Optimized RK handler p.8*

This mailing is the first "permanent" issue of the UNIX NEWS. As previously announced, this will be a bimonthly, mailed at the end of each odd month. Here a special issue is warranted, we will include its contents in the next regularly numbered issue. Preceding this issue, there were three mailings. The first was the invitation to be placed on the mailing list which is reproduced in this issue. The second was a notice of the June 18th New York meeting and the Harvard software. The third was the "special issue" dated July 16 announcing the new edition of UNIX.

There were no objections to publishing the mailing list and so we are including it in this issue. The integer part of the sequence number on the first line corresponds to a list of licensees that Ken Thompson keeps. The fractional part designates multiple installations under a single license. Since we may have several such, we will mail a copy of the newsletter to each, provided we receive a returned copy of the coupon on the invitation to subscribe.

The original letter went to approximately 76 people, all but 6 of whom responded. Subsequent letters recently went to 20 new installations and, to date, the mailing list contains 37 names. Our only communications problems are at locations where the only name is a contracts officer and with multiple installations. I would ask each of you to scan the list of names and let me know of any installations you know of which are not on the list.

## USER SOFTWARE EXCHANGE

It is apparent that there is lots of user software under UNIX that is in general use and this newsletter's greatest utility is probably in announcing availability of software. We invite discussion in this newsletter of software philosophy with respect to licensing, distribution, costs, and the relation of commercial licensees to software exchange.

## NEW YORK MEETING

The meeting on June 18 at the City University of New York was attended by over 40 people from 20 installations. Each installation described briefly its function and idiosyncrasies. We will not try to reproduce them here since we expect one page write-ups for subsequent inclusion from each installation. (Several such are included in this issue.) There was unanimous sentiment for keeping the users' group and its newsletter as informal as possible.

Address Correspondence to

Prof. H. Ferentz, Physics Dept. Brooklyn College of CUNY Brooklyn, NY 11210



EDITORIAL

Happy Xmas (assuming you read this in time) and in any case a Happy New Year for the first year of this newsletter. It was conceived at IUCC in September but gestation has taken a little while; now it is born we hope it will grow into a spirited youngster!

Very many thanks to those who sent in contributions (and a polite reminder to those who said they would contribute but didn't!). At the moment we have eleven interested installations, all in Computing Science or Electrical Engineering Depts. At this point it seems worth quoting a passage from the QMC contribution (see later) "... Unix is a valuable reference point for discussion about problems in Computer Science teaching and research. We are particularly interested in hearing views and experience on the role of Unix in undergraduate Computer Science teaching." Any offers?

With regard to software exchange we must agree with QMC that it is probably only worthwhile for fairly large programs e.g. compilers. In order to facilitate this we have listed the magnetic tape and disc devices available at various installations, the commonest being RK05 cartridges and DEC tapes, but unfortunately no-one claims to possess both! Even where people are unwilling or unable to exchange software, it would be useful to know of others who for example are running the same compilers, so that one can exchange notes on useful dodges and modifications and ways round apparently insuperable difficulties. Perhaps people could be encouraged to send in articles on their experience with particular pieces of large software, so that the rest of us could decide on whether they were worth getting?

Let us now clarify the role of the correspondent at each installation. The idea was suggested and approved at the IUCC meeting, but not very well defined. Some installations have been unwilling to provide correspondents, probably because they are afraid of becoming acting unpaid advisers! This could be avoided if any installation offering information about or exchange of particular pieces of software in this newsletter, would name a contact each time (possibly even in U.S.A). The correspondent's main job would then be to encourage interest in the newsletter within his department, solicit articles, send in interesting gossip and occasionally answer queries from people who don't know who else to contact. With this understanding we publish below a list of Unix installations and correspondents.

The next issue will probably be in April. Please send in your contributions!

P. M. D. GRAY  
DEPT OF COMPUTING SCIENCE  
UNIVERSITY OF ABERDEEN  
KING'S COLLEGE  
ABERDEEN AB9 2UB

# UNIX OPERATING SYSTEM SOURCE CODE LEVEL SIX

This booklet has been produced for students at the University of New South Wales taking courses 6.602B and 6.657G.

It contains a specially edited selection of the UNIX Operating System source code, such as might be used on a typical PDP11/40 computer installation.

The UNIX Software System was written by K. Thompson and D. Ritchie of Bell Telephone Laboratories, Murray Hill, N.J. It has been made available to the University of New South Wales under a licence from the Western Electric Company.

This document may contain information covered by one or more licences, copyrights and non-disclosure agreements. Circulation of this document is restricted to holders of a licence for the UNIX Software System from Western Electric. All other circulation or reproduction is prohibited.

J. Lions  
Department of Computer Science  
The University of New South Wales.  
November 1977  
Fourth Printing

To Peter Salus

With best wishes

from John Lions

.... after all these years!

# Software Tools COMMUNICATIONS

**NUMBER 4**

**OCTOBER 1980**

--- MERGER (OR LACK THEREOF) WITH USENIX ---

In the previous newsletter a suggestion was made that the Software Tools group merge with the Usenix group. From the responses we received, it appeared that a merger would be acceptable if the Software Tools group could maintain its identity and independence within Usenix. The Usenix people have been quite supportive of the software tools group, especially in organizing the meetings. Nevertheless, it was felt that a merger would be premature.

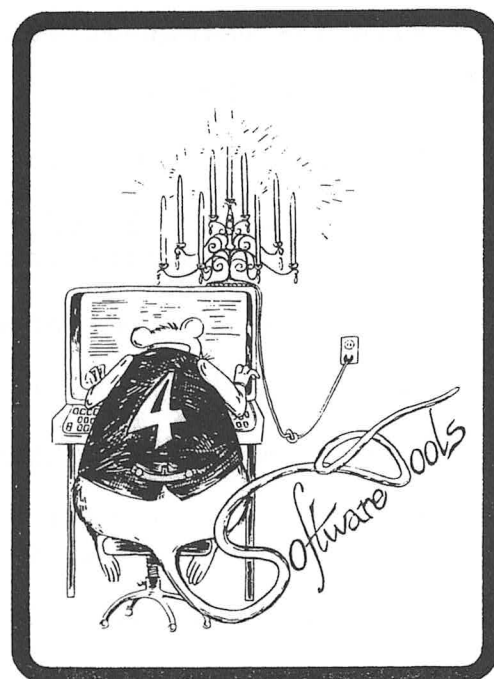
The Usenix group is an organization of installations who have entered into a contractual agreement with Western Electric to run the Unix operating system. Individuals can join the group for purposes of receiving the newsletter. They are not allowed to vote.

The Usenix Board of Directors is in the process of re-evaluating their By-Laws. In the future, the Usenix group could include individuals and organizations running not only the software tools, but other Unix look-alike systems as well. Merger at that time would seem to make more sense.

--- BASIC TAPE ---

Work on the basic tape is about two thirds completed. A version of Ratfor with capabilities similar to the 7th Edition Unix Ratfor has been acquired and enhanced to include some special features necessary to allow tools from the University of Arizona, Lawrence Berkeley Laboratory, and Georgia Institute of Technology to pass through it.

The latest tools from the University of Arizona and LBL are currently at Georgia Tech, where they will be tested and merged with the GT tools. The tape should be ready for distribution later this fall.



## SOFTWARE TOOLS BASIC TAPE

Enclosed is a copy of the Software Tools Basic Tape, as distributed by the Software Tools Users Group. Unless otherwise stated on the label, the tape is in ASCII, 800 BPI, and written either 2048 characters per record (lines terminated with an ASCII NEWLINE character), or 80 characters per card image with 40 card images per block. Where space has permitted, the files have been included on the tape twice for increased reliability.

Complete instructions for implementing the tools package are given on File 1 of the tape.

### CONTENTS

- File 1 - The COOKBOOK - instructions for implementing the tape and software tools primitives
- File 2 - COPY - Fortran I/O routines necessary for the bootstrap
- File 3 - Ratfor bootstrap (in Fortran)
- File 4 - Library Routines, Symbol Definitions, and Temporary Versions of the Primitives
- File 5 - ECHO tool, useful for debugging the 'getarg' primitive
- File 6 - The CAT tool for testing File Access Primitives
- File 7 - the INCL tool, useful for preparing to preprocess 'ratfor'
- File 8 - RATFOR in ratfor
- File 9 - FORMAT - the text formatter
- File 10 - AR - the file archiver
- File 11 - ED - 2 versions of the text editor, plus instructions for implementing the random I/O primitives
- File 12 - The Remainder of the Basic Tools
- File 13 - The SHELL - command line interpreter
- File 14 - Documentation
- File 15 - Additional Tools (which have been included as they were received; some may require additional primitives)
- File 16 - Spelling Dictionary

STANFORD RESEARCH INSTITUTE  
MENLO PARK, CALIFORNIA



December 1968

*Final Report*

## A STUDY OF COMPUTER NETWORK DESIGN PARAMETERS

*By:* E. B. SHAPIRO

*Prepared for:*

ADVANCED RESEARCH PROJECTS AGENCY  
WASHINGTON, D.C. 20301

CONTRACT DAHC04-68-C-0017

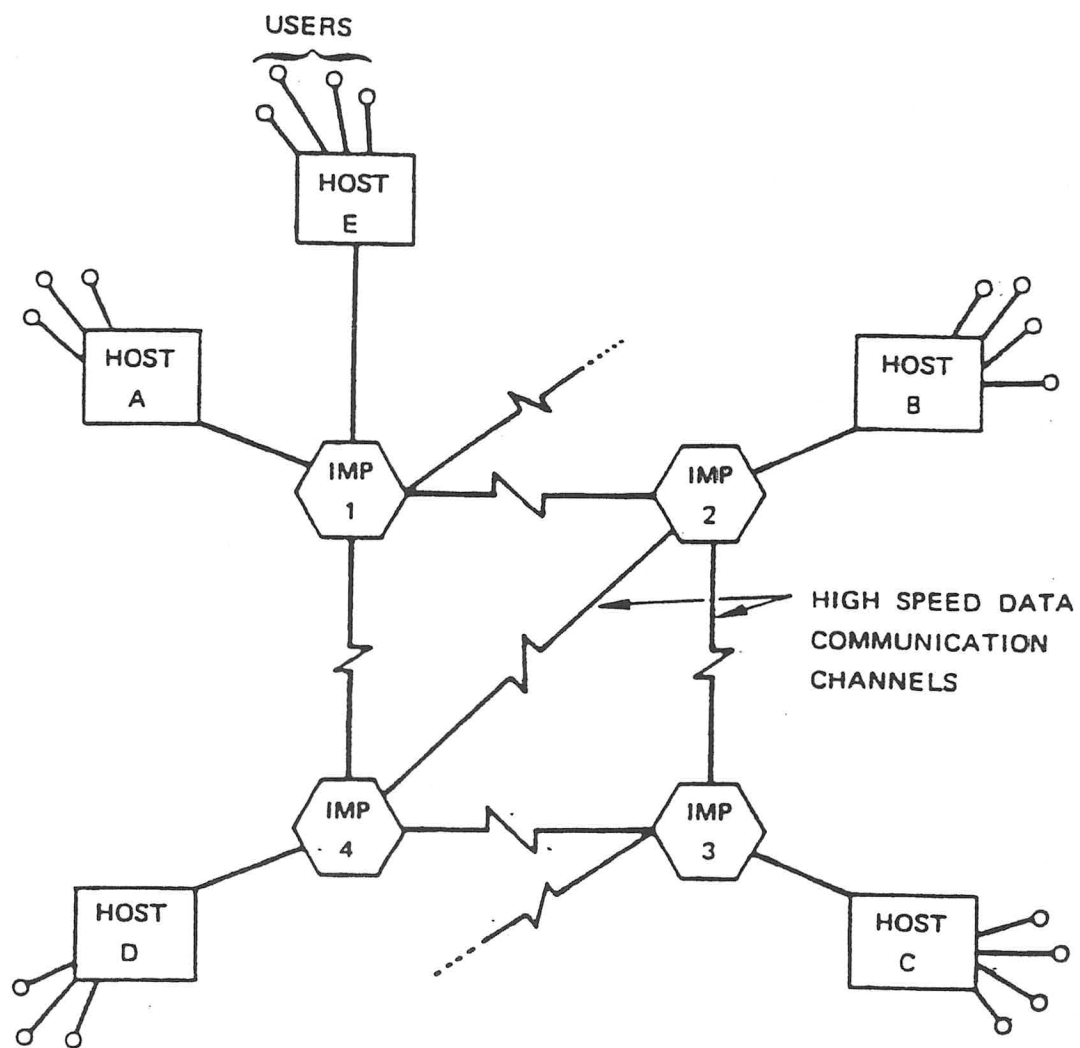
*SRI Project 7016*

*Approved:* D. R. BROWN, DIRECTOR  
Information Science Laboratory

TORBEN MEISLING, EXECUTIVE DIRECTOR  
Information Science and Engineering

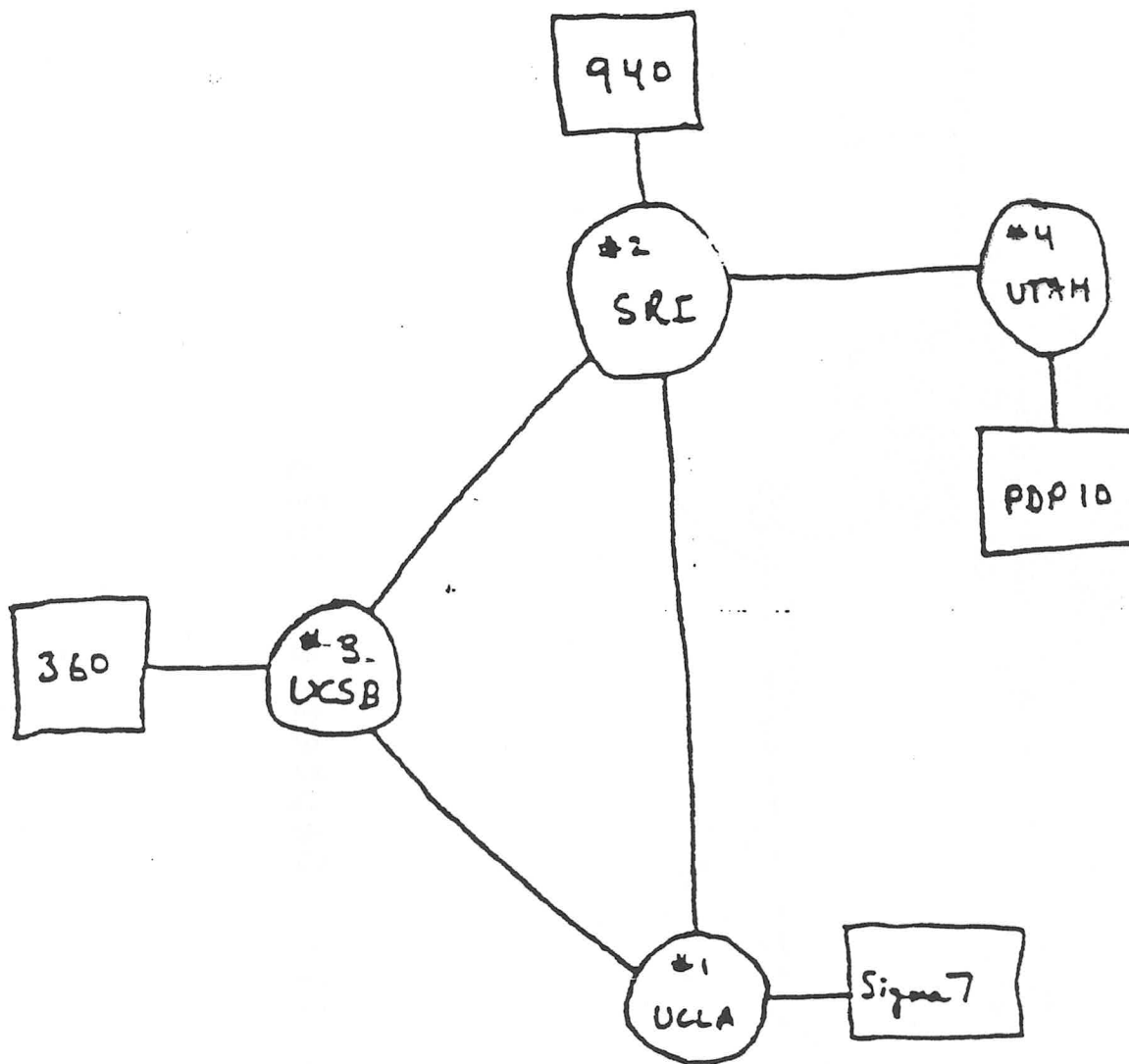
This research was supported by the Advanced Research Projects Agency and was monitored by the U.S. Army Research Office-Durham under Contract DAHC04-68-C-0017

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FIG. 1 THE NETWORK MODEL



THE ARPANET NETWORK

DEC 1969

4 NODES

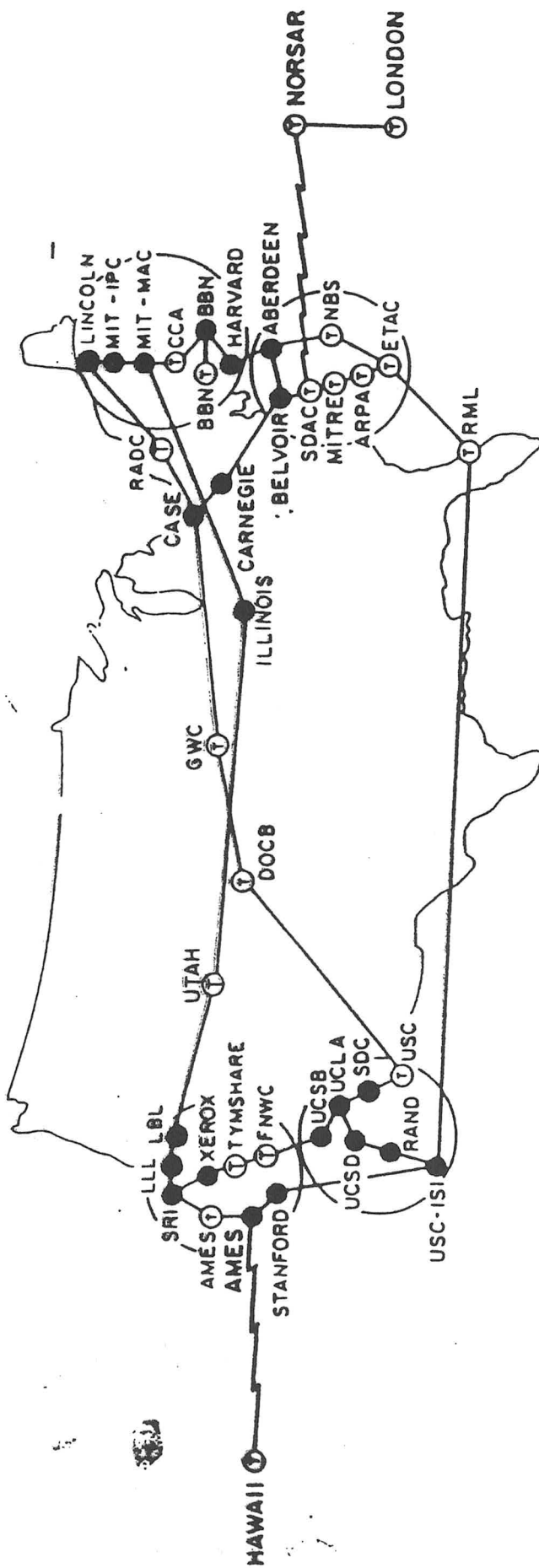


Figure 11: September 1973



## The EIN Network



## A Presentation of the European Informatics Network

COopération européenne dans le domaine de la recherche  
Scientifique et Technique  
(COST)

On Wednesday,  
the fifth day of April,  
Nineteen Hundred and Seventy Eight  
there will be

A Novel Public  
Presentation of the  
COST Project Number Eleven

## “A EUROPEAN INFORMATICS NETWORK”

established by an agreement between the

Federal Republic of Germany

French Republic

Italian Republic

Kingdom of Norway

Kingdom of the Netherlands

Kingdom of Sweden

Republic of Portugal

Socialist Federal Republic of Yugoslavia

Swiss Confederation

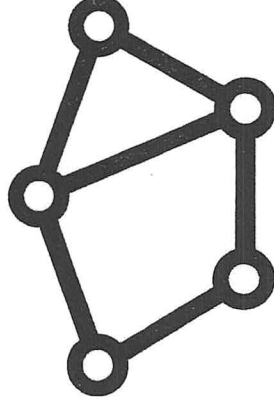
United Kingdom of Great Britain and Northern Ireland

European Atomic Energy Community (EURATOM)

## A Concourse of Computers

Similar presentations, given concurrently at several Centres, constitute the “Concourse of Computers” arranged by the Management Committee for COST Project II, through the medium of the

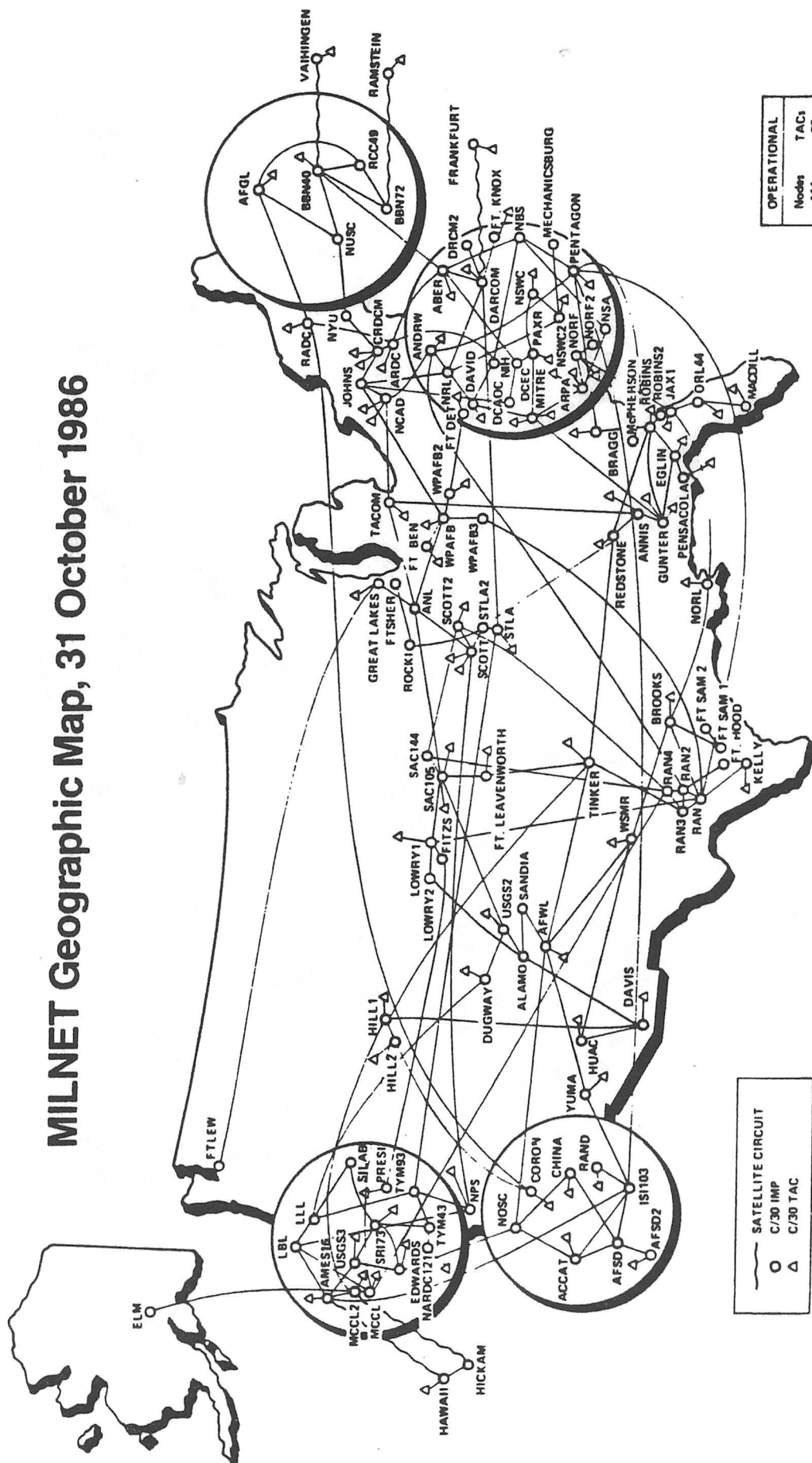
## European Informatics Network



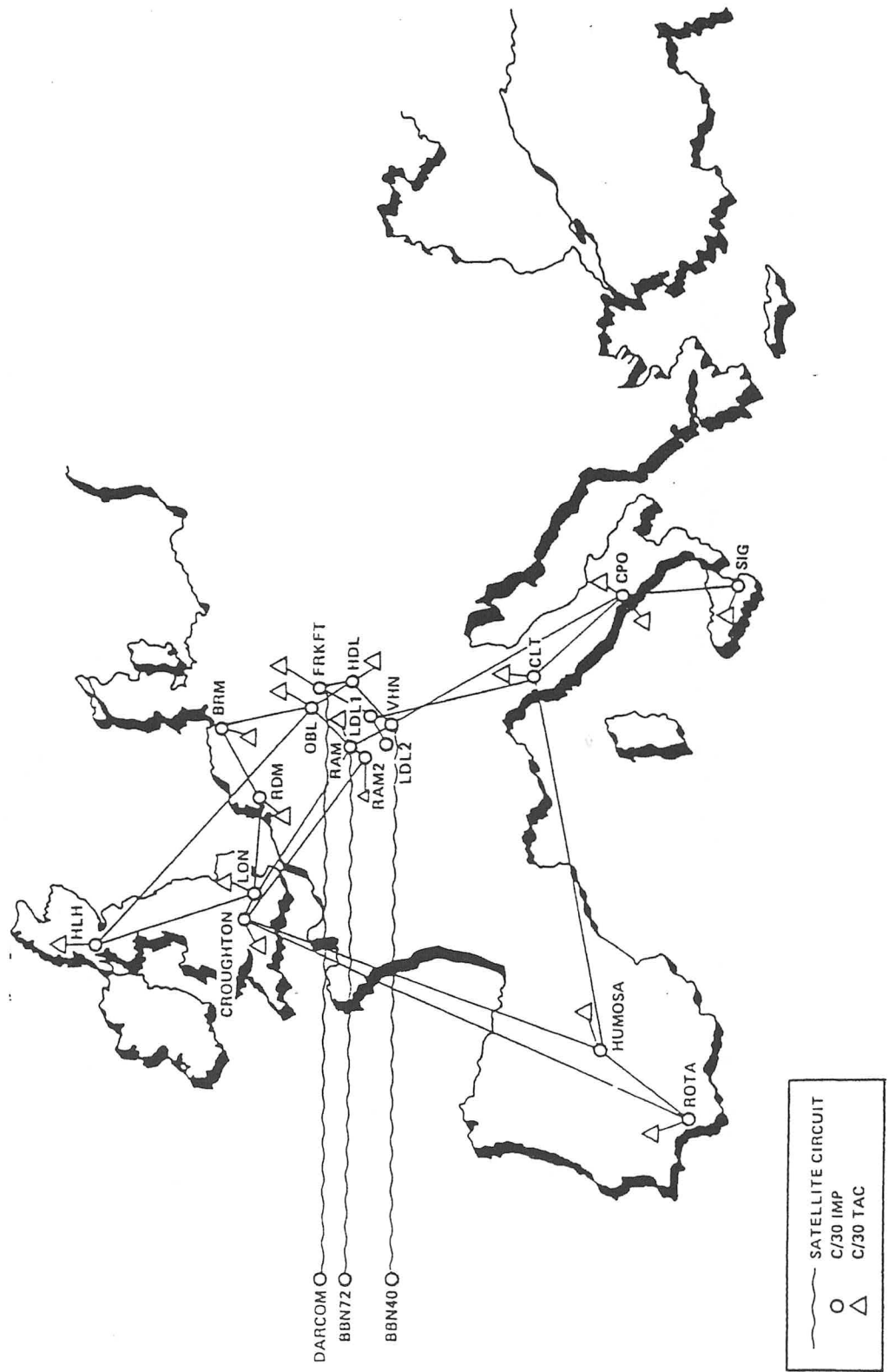
Events at divers Centres will be coordinated. They will comprise short lectures illustrated by demonstrations of facilities available to the EIN Community, with the purpose of indicating the aims of the Project, its achievements and its relevance to the future of European Teleinformatics.

Emphasis will be placed on the applications of networks, on the problems arising from the use of heterogeneous computer systems at the Centres and on the solutions being worked out by EIN. These solutions are becoming especially important in the context of the new public data networks, now becoming available in Europe and in some other parts of the world.

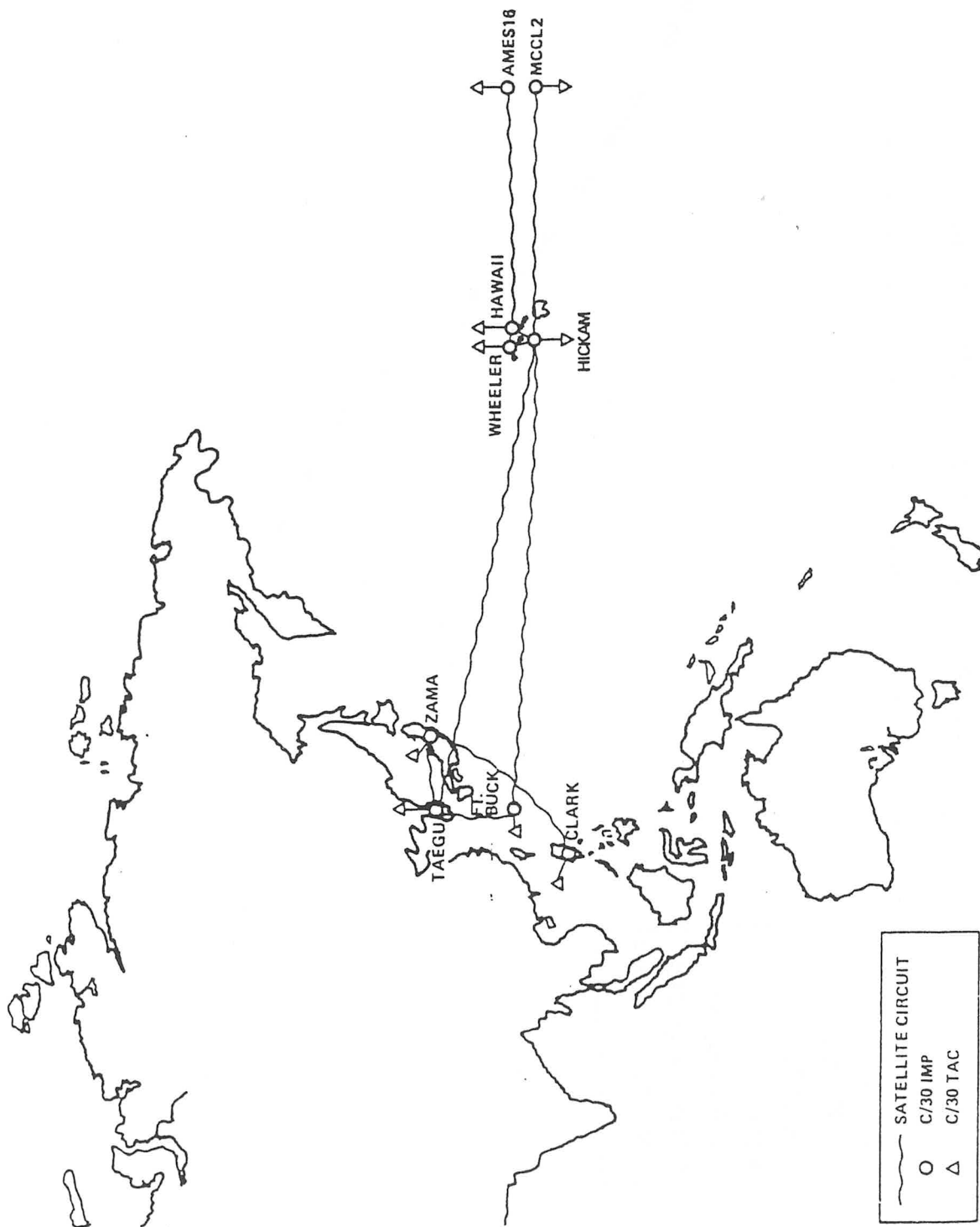
# MILNET Geographic Map, 31 October 1986



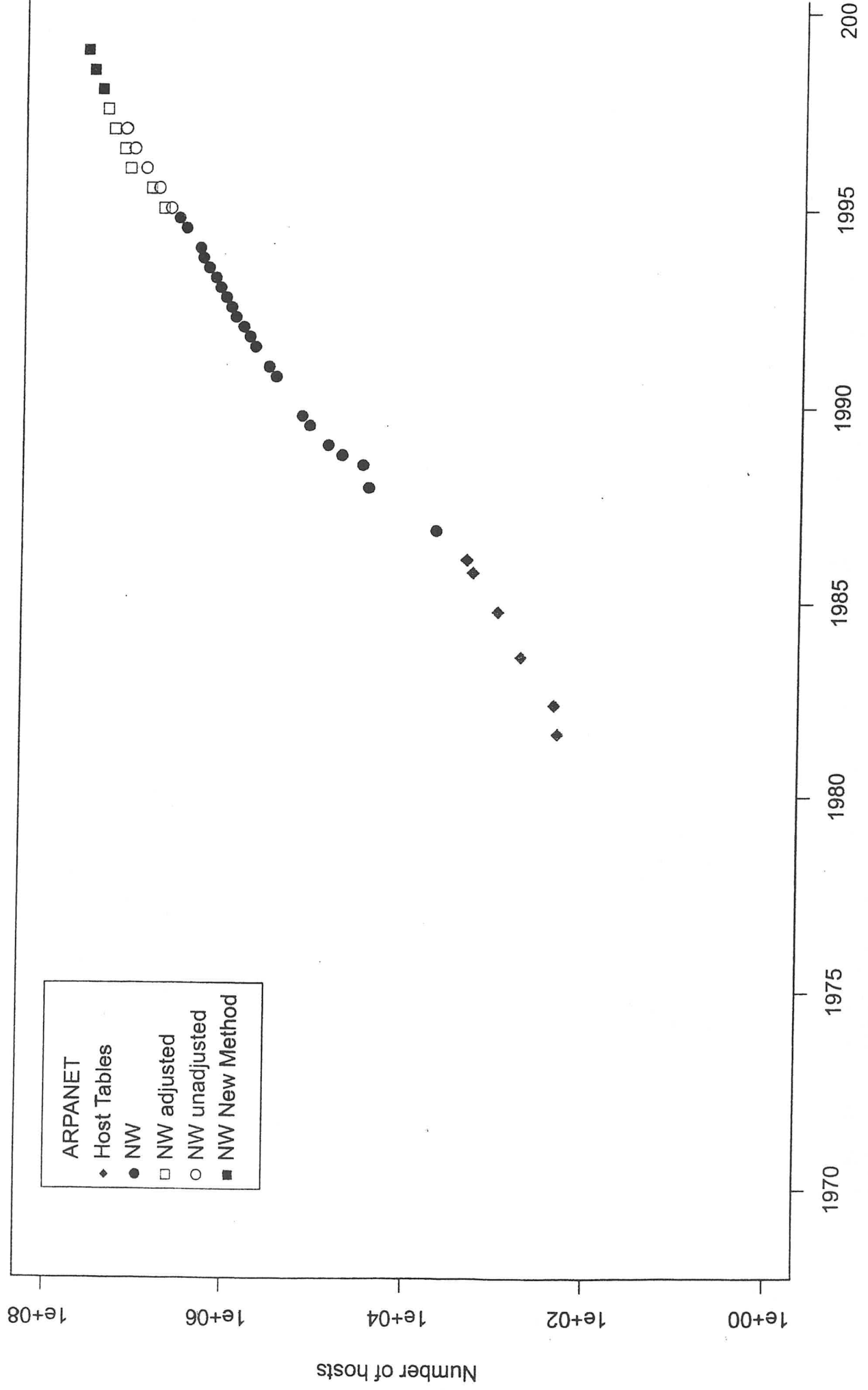
# European MILNET Geographic Map, 31 July 1986



# Pacific MILNET Geographic Map, 31 July 1986



# Internet Host Numbers: 1969 - 1999



# Internet Host Numbers: Growth Rates 1992 - 2002

